Research Article

Risk And Symptoms Of Obstructive Sleep Apnea Among The Adult Population In Saudi Arabia

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Abstract

Background: Obstructive sleep apnea (OSA), a common sleep-related breathing disorder, is associated with increased cardiovascular and metabolic morbidity, reduced quality of life, and excessive daytime sleepiness (EDS).

Methods: A cross-sectional survey of 385 adults was conducted in Saudi Arabia. A structured questionnaire was used to record sociodemographic characteristics, body mass index (BMI), smoking status, chronic illnesses, and medication use, and the Epworth Sleepiness Scale (ESS) was used to assess daytime sleepiness. Descriptive and inferential statistics were performed using the Statistical Package for the Social Sciences (SPSS) version 26.

Results: The majority of participants were married (72.7%), Saudi nationals (92.2%), and female (69.6%), and 45.2% were aged 36–45 years. Overall, 42.3% of participants were overweight and 7.8% were obese, with a mean BMI of 29.36 ± 8.55 kg/m². The mean ESS score was 9.56 ± 5.36. In total, 39.0% of participants reported excessive daytime sleepiness; of these, 19.5% had mild EDS, 3.9% had moderate EDS, and 15.6% had severe EDS. Age, female sex, marital status, postgraduate education, overweight status, medication use, and asthma were all significantly associated with EDS ($p<0.05$). ESS scores showed a weak but statistically significant positive correlation with BMI ($r=0.21$, $p<0.001$).

Conclusion: Excessive daytime sleepiness was common among Saudi adults and was associated with a number of demographic and clinical characteristics, most notably elevated BMI. Routine screening for sleep disorders in primary healthcare, alongside efforts to address obesity and other modifiable risk factors, is warranted.

Keywords: obstructive sleep apnea, excessive daytime sleepiness, Epworth Sleepiness Scale, body mass index, adults, Saudi Arabia.

Introduction

Obstructive sleep apnea syndrome (OSAS) is a sleep-related breathing disorder characterized by repeated episodes of apnea and hypopnea during sleep [1]. It is caused by sustained or intermittent partial or complete upper airway obstruction resulting from relaxation of the muscles surrounding the throat and tongue [2]. This condition disrupts normal sleep architecture and is frequently associated with arousals, sleep fragmentation, and intermittent hypoxia and/or hypercapnia, leading to significant neurobehavioral and cardiorespiratory consequences [2]. Consequently, OSAS may result in excessive daytime sleepiness (EDS), growth failure, poor academic performance, behavioral problems, cor pulmonale, and an increased risk of traffic accidents and sudden death [3].

In Western countries, the prevalence of mild and moderate OSAS is estimated to be approximately 20% and 7%, respectively [4], with at least mild OSA affecting approximately 9% of women and 24% of men [5]. The disorder commonly presents with non-restorative sleep, loud snoring, witnessed apneas, daytime sleepiness, and morning headaches [6]. Snoring is the most frequently reported symptom, followed by daytime sleepiness, which has been reported in approximately one-third of the general population [7]. Excessive daytime sleepiness remains one of the most common manifestations among patients with OSA [8].

Obstructive sleep apnea is associated with numerous adverse health outcomes, including hypertension, obesity, coronary artery disease, metabolic dysfunction, cognitive decline, and cancer progression [8,9]. Obesity is considered the most important modifiable risk factor, with OSA affecting up to 50% of obese men, although the disorder can also occur in individuals with normal body weight [7,10]. Previous studies have demonstrated that approximately 40% of obese individuals suffer from sleep apnea, while nearly 70% of patients diagnosed with sleep apnea are obese [9,10]. Furthermore, observational studies have shown that the prevalence of OSA exceeds 30% among patients with hypertension and approaches 80% among those with resistant hypertension [11].

The high prevalence of obesity, smoking, and diabetes in the Middle East contributes substantially to the burden of OSA [10]. Countries in the Gulf region, including Saudi Arabia, the United Arab Emirates, Qatar, Bahrain, Kuwait, and Oman, have experienced a rapid increase in obesity-related OSA over recent decades [12,13].

In Saudi Arabia, OSA represents an important public health concern. A cross-sectional study conducted among adults attending primary healthcare centers in Al-Ahsa reported a high prevalence of obstructive sleep apnea symptoms, particularly among overweight and obese individuals [14]. Similar findings have been reported among primary healthcare attendees in Riyadh, where obesity and hypertension were identified as major predictors of OSA risk [18], and among Saudi adults more broadly, in whom sleep disorders have been linked to obesity and chronic disease [19]. Because excessive daytime sleepiness is one of the principal manifestations of OSA and can be reliably assessed using the Epworth Sleepiness Scale (ESS), evaluating its prevalence and associated factors may facilitate earlier identification of individuals at increased risk of OSA [15].

This study aimed to assess the risk and symptoms of obstructive sleep apnea among the adult population in Saudi Arabia.

Subjects and Methods

Study design, location and time: a cross-sectional study was conducted in Saudi Arabia between May and July 2026.

Study participants: the inclusion criteria were adults (≥18 years) of both genders residing in Saudi Arabia; participants younger than 18 years and those residing outside Saudi Arabia were excluded.

Sample size: the Raosoft online calculator was used for sample size determination. Using a margin of error of 5% and a confidence interval of 95%, a minimum sample of 385 was calculated.

Data collection: in order to boost the response rate, a self-administered questionnaire in Arabic was distributed to the target population via Google Forms (Google, Mountain View, California, USA). The first section of the questionnaire covered participants' characteristics (age, gender, marital status, nationality, education level, area of residence, weight, height, smoking habits, chronic diseases, and medication use). The second section comprised the Epworth Sleepiness Scale (ESS), used to assess daytime sleepiness as an indicator of OSA risk. The ESS consists of eight items, each rated on a four-point Likert scale ranging from 0 ("would never doze") to 3 ("high chance of dozing"), giving a total score of 0 to 24. Scores were interpreted as follows: 0–5, lower normal daytime sleepiness; 6–10, higher normal daytime sleepiness; 11–12, mild excessive daytime sleepiness; 13–15, moderate excessive daytime sleepiness; and 16–24, severe excessive daytime sleepiness. A score of ≥11, denoting excessive daytime sleepiness (EDS), is the most widely used threshold and is generally regarded as abnormal in clinical practice and research [15,16].

Ethical considerations: ethical approval for the study was obtained from the ethics research committee of Alslamah Primary Health Care Center, Ministry of Health (MOH), Taif City, Saudi Arabia.

Data analysis: data were statistically analyzed using the Statistical Package for the Social Sciences (SPSS) version 26. Qualitative data were expressed as numbers and percentages, and associations between variables were examined using the Chi-squared test (χ^2). Non-parametric quantitative variables, expressed as mean ± standard deviation (SD), were compared using the Mann–Whitney test. Correlation analysis was performed using Spearman's test. A p-value of less than 0.05 was considered statistically significant.

Results

Among the 385 study participants, 45.2% were aged 36–45 years, while 34.3% were older than 45 years. Most participants were female (69.6%), Saudi nationals (92.2%), and married (72.7%). Regarding educational attainment, 57.9% held a bachelor's degree and 30.9% had a postgraduate degree. The mean body mass index (BMI) among participants with available data (n = 371) was 29.36 ± 8.55 kg/m², with 42.3% classified as overweight and 7.8% as obese. The majority were non-smokers (88.3%), 46.0% reported taking one or more medications, and 7.8% were using sedative medications. Regarding chronic diseases, hypertension was the most commonly reported condition (15.1%), followed by other chronic diseases (19.0%), diabetes mellitus (10.9%), and asthma (7.8%) (Table 1).

Table 1. Sociodemographic and health-related characteristics of the study participants (No.: 385)

Variable	No. (%)
Age group	
18–25 years	37 (9.6)
26–35 years	42 (10.9)
36–45 years	174 (45.2)
>45 years	132 (34.3)

Variable	No. (%)
Gender	
Female	268 (69.6)
Male	117 (30.4)
Nationality	
Saudi	355 (92.2)
Non-Saudi	30 (7.8)
Marital status	
Single	75 (19.5)
Married	280 (72.7)
Divorced	30 (7.8)
Educational level	
High school	43 (11.2)
Bachelor's degree	223 (57.9)
Postgraduate	119 (30.9)
Body mass index (BMI)	
Underweight (<18.5 kg/m²)	14 (3.6)
Normal weight (18.5–24.9 kg/m²)	178 (46.2)
Overweight (25–29.9 kg/m²)	163 (42.3)
Obesity (≥30 kg/m²)	30 (7.8)
BMI, kg/m², mean ± SD (n = 371)	29.36 ± 8.55
Current smoking status	
No	340 (88.3)
Yes	45 (11.7)
Current medication use	
Sedative medications (e.g., barbiturates): no	355 (92.2)
Sedative medications (e.g., barbiturates): yes	30 (7.8)
No medications currently used	208 (54.0)
Taking one or more medications	177 (46.0)
Chronic diseases	
Hypertension	58 (15.1)
Diabetes mellitus	42 (10.9)
Asthma	30 (7.8)
Other chronic diseases	73 (19.0)

Chronic disease rows show the number of participants reporting the condition. SD: standard deviation.

Table 2 presents participants' responses to the individual items of the Epworth Sleepiness Scale (ESS). The mean ESS score was 9.56 ± 5.36.

Table 2. Participants' responses to the Epworth Sleepiness Scale (ESS) items (No.: 385)

Variable	No. (%)
Sitting and reading	
Would never doze	134 (34.8)
Slight chance of dozing	103 (26.8)
Moderate chance of dozing	88 (22.9)
High chance of dozing	60 (15.6)
Watching TV	
Would never doze	118 (30.6)

Variable	No. (%)
Slight chance of dozing	89 (23.1)
Moderate chance of dozing	103 (26.8)
High chance of dozing	75 (19.5)
Sitting inactive in a public place	
Would never doze	147 (38.2)
Slight chance of dozing	163 (42.3)
Moderate chance of dozing	45 (11.7)
High chance of dozing	30 (7.8)
Passenger in a car for one hour	
Would never doze	104 (27.0)
Slight chance of dozing	103 (26.8)
Moderate chance of dozing	103 (26.8)
High chance of dozing	75 (19.5)
Lying down to rest in the afternoon	
Would never doze	15 (3.9)
Slight chance of dozing	60 (15.6)
Moderate chance of dozing	116 (30.1)
High chance of dozing	194 (50.4)
Sitting and talking to someone	
Would never doze	251 (65.2)
Slight chance of dozing	74 (19.2)
Moderate chance of dozing	30 (7.8)
High chance of dozing	30 (7.8)
Sitting quietly after lunch (without alcohol)	
Would never doze	133 (34.5)
Slight chance of dozing	104 (27.0)
Moderate chance of dozing	29 (7.5)
High chance of dozing	119 (30.9)
In a car while stopped in traffic	
Would never doze	267 (69.4)
Slight chance of dozing	59 (15.3)
Moderate chance of dozing	29 (7.5)
High chance of dozing	30 (7.8)

Figure 1 shows the distribution of participants across the ESS score categories. The highest proportion fell into the higher normal daytime sleepiness category (37.7%), followed by lower normal daytime sleepiness (23.4%). A substantial proportion of the sample exhibited some degree of excessive daytime sleepiness: 19.5% had mild EDS, 3.9% had moderate EDS, and 15.6% had severe EDS. Overall, 61.0% of participants fell within the normal daytime sleepiness range, while 39.0% were classified as having excessive daytime sleepiness (Figure 2).

Figure 1. Distribution of the participants according to the ESS score categories

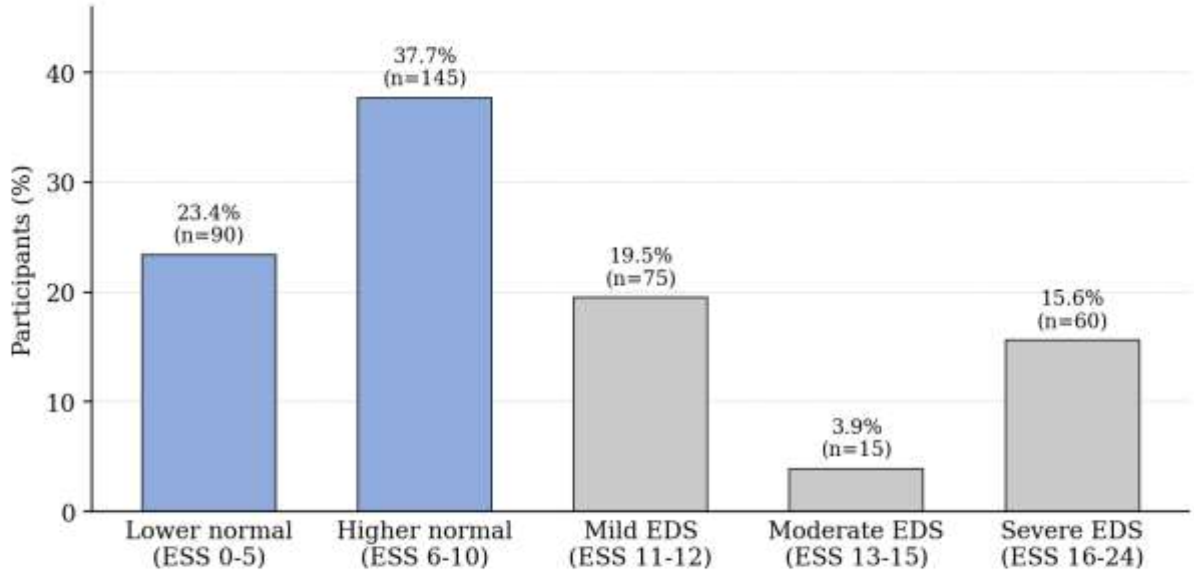


Figure 2. Prevalence of overall excessive daytime sleepiness (EDS)

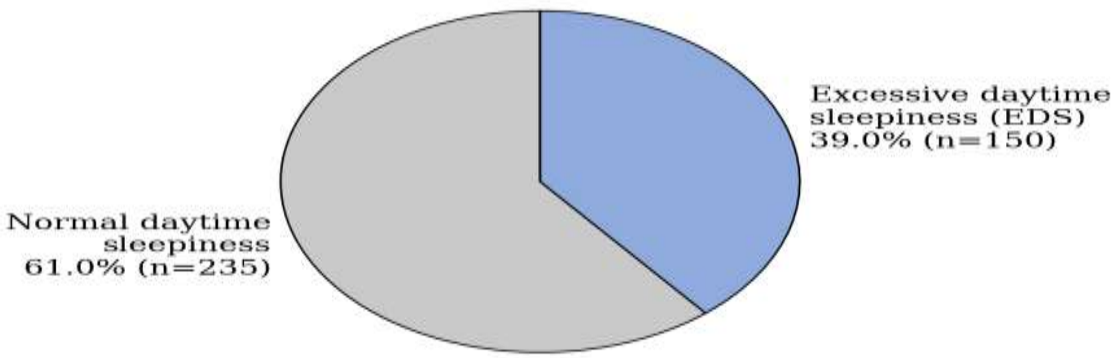


Table 3 shows that the prevalence of excessive daytime sleepiness (EDS) was significantly higher among participants aged 36–45 years, females, married individuals, and those holding a postgraduate degree ($p<0.05$). A significantly higher prevalence of EDS was also observed among participants who were overweight, those taking one or more medications, and individuals with asthma ($p<0.05$). Participants with EDS had a significantly higher mean BMI than those with normal daytime sleepiness (32.52 ± 11.05 versus 27.21 ± 5.37 kg/m^2, $p<0.001$). Conversely, high school education, underweight or normal BMI status, hypertension, diabetes mellitus, and other chronic diseases were more prevalent among participants with normal daytime sleepiness ($p<0.05$). No significant differences in the prevalence of EDS were found according to nationality, smoking status, or the use of sedative medications ($p>0.05$).

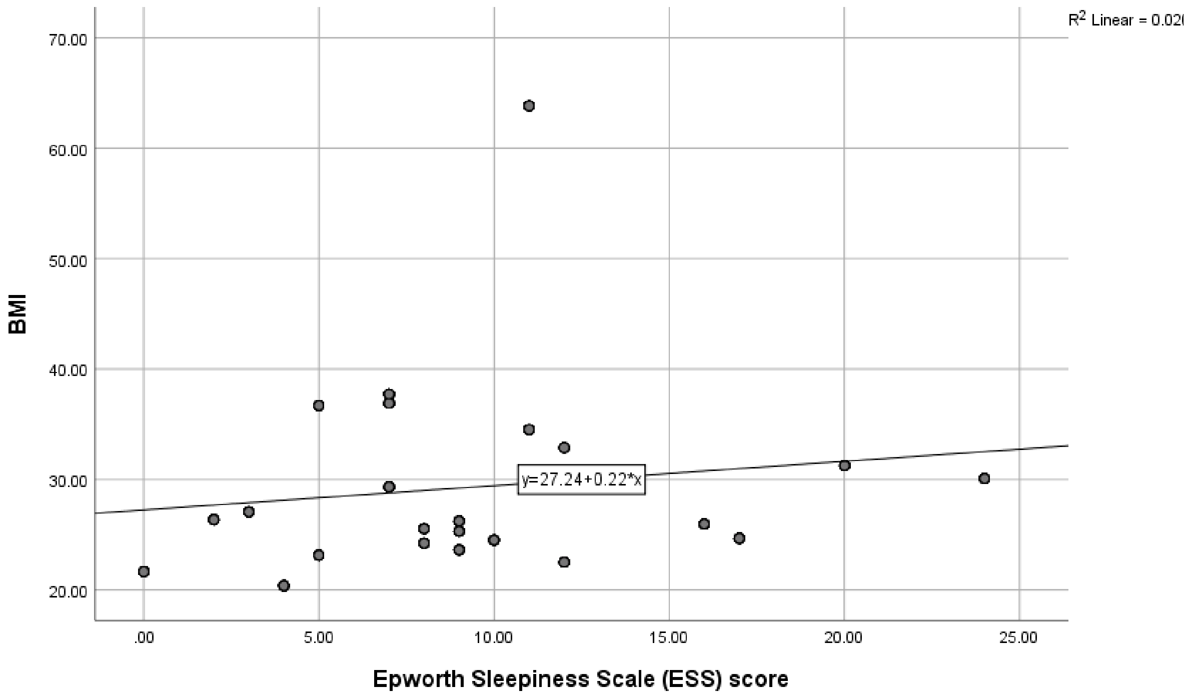
Table 3. Relationship between excessive daytime sleepiness (EDS) and participants' sociodemographic and health-related characteristics (No.: 385)

Variable	Normal daytime sleepiness (n = 235), No. (%)	Excessive daytime sleepiness (n = 150), No. (%)	χ²	p-value
Age group				
18–25 years	17 (7.2)	20 (13.3)	6.74	**<0.001**
26–35 years	28 (11.9)	14 (9.3)		
36–45 years	88 (37.4)	86 (57.3)		
>45 years	102 (43.4)	30 (20.0)		
Gender				
Female	148 (63.0)	120 (80.0)	10.54	**<0.001**
Male	87 (37.0)	30 (20.0)		
Nationality				
Saudi	220 (93.6)	135 (90.0)	1.66	0.197
Non-Saudi	15 (6.4)	15 (10.0)		
Marital status				
Single	60 (25.5)	15 (10.0)	14.66	**0.001**
Married	160 (68.1)	120 (80.0)		
Divorced	15 (6.4)	15 (10.0)		
Educational level				
High school	43 (18.3)	0 (0.0)	11.20	**<0.001**
Bachelor's degree	133 (56.6)	90 (60.0)		
Postgraduate	59 (25.1)	60 (40.0)		
Body mass index (BMI)				
Underweight (<18.5 kg/m²)	14 (6.0)	0 (0.0)	12.58	**<0.001**
Normal weight (18.5–24.9 kg/m²)	133 (56.6)	45 (30.0)		
Overweight (25–29.9 kg/m²)	73 (31.1)	90 (60.0)		
Obesity (≥30 kg/m²)	15 (6.4)	15 (10.0)		
BMI, kg/m², mean ± SD (n = 371)	27.21 ± 5.37	32.52 ± 11.05	5.93*	**<0.001**
Current smoking status				
No	205 (87.2)	135 (90.0)	0.67	0.410
Yes	30 (12.8)	15 (10.0)		
Current medication use				
Sedative medications (e.g., barbiturates)	15 (6.4)	15 (10.0)	1.66	0.197
Taking one or more medications	87 (37.0)	90 (60.0)	9.46	**<0.001**
Chronic diseases				
Hypertension	43 (18.3)	15 (10.0)	4.92	**0.026**
Diabetes mellitus	42 (17.9)	0 (0.0)	10.09	**<0.001**
Asthma	0 (0.0)	30 (20.0)	10.97	**<0.001**
Other chronic diseases	58 (24.7)	15 (10.0)	12.84	**<0.001**

* Mann–Whitney test; all other comparisons used the Chi-squared test. Chronic disease rows show the number of participants reporting the condition.

Figure 3 shows that a weak but statistically significant positive correlation was found between ESS scores and BMI ($r = 0.21$, $p<0.001$).

Figure 3. Spearman's correlation analysis between the Epworth Sleepiness Scale (ESS) scores and BMI



r = 0.21, p<0.001.

Discussion

With a mean Epworth Sleepiness Scale (ESS) score of 9.56 ± 5.36, the current study showed that 39.0% of Saudi adults had excessive daytime sleepiness (EDS). Excessive daytime sleepiness is one of the main clinical signs of obstructive sleep apnea and has been linked to poorer quality of life, decreased productivity, impaired cognitive function, and a higher risk of cardiovascular disease and motor vehicle accidents [12,16].

A statistically significant positive correlation was found between BMI and ESS scores, and overweight participants were more likely to report excessive daytime sleepiness. Because fat deposition around the upper airway increases airway collapsibility during sleep, these results are in line with earlier epidemiological research showing that obesity is the strongest modifiable risk factor for OSA [4,17]. Similar findings have been reported in Saudi Arabia, where obesity has consistently been identified as one of the main predictors of OSA in adults [14,18]. It should be noted, however, that the strength of the correlation observed here was weak, indicating that BMI accounts for only a small proportion of the variance in daytime sleepiness.

The current study's findings regarding the prevalence of excessive daytime sleepiness are consistent with earlier Saudi research showing a significant burden of OSA symptoms in the adult population. Alsultan et al. reported that obesity was one of the strongest associated factors for the high prevalence of obstructive sleep apnea symptoms among adults in Al-Ahsa [14]. Similarly, Wali et al. found that approximately one-fifth of participants attending primary healthcare facilities in Riyadh were at high risk of OSA, with obesity and hypertension being the strongest predictors [18]. Ahmed et al. likewise reported a considerable burden of sleep disorders among Saudi adults, associated with obesity and chronic disease [19]. These results highlight the rising prevalence of sleep-related breathing disorders in Saudi Arabia.

Compared with male participants, female participants in the current study showed noticeably higher rates of excessive daytime sleepiness. Although OSA has historically been considered more common in men, recent research shows that women often present with atypical symptoms such as fatigue and daytime sleepiness rather than loud snoring and witnessed apneas, which can lead to delayed diagnosis and under-recognition [20]. This observation may also have been influenced by the preponderance of female participants in the present sample.

The prevalence of excessive daytime sleepiness was substantially higher among participants aged 36–45 years than among younger participants. Increasing age has repeatedly been linked to a higher risk of OSA, owing to age-related reductions in upper airway muscle tone as well as the rising incidence of obesity and chronic illness [4]. Studies conducted in Saudi Arabia assessing adult OSA risk have shown similar age-related trends [18]. It is notable, however, that participants older than 45 years in the present sample reported EDS less frequently than those aged 36–45 years, which may reflect differences in occupational demands, sleep opportunity, or reporting between these groups.

In the current study, medication use was also substantially associated with excessive daytime sleepiness. Regardless of the presence of OSA, a number of commonly prescribed drugs, such as sedatives, muscle relaxants, antihistamines, and antidepressants, may independently contribute to daytime somnolence [21]. Furthermore, excessive daytime sleepiness was much more common among participants with asthma. Asthma and OSA have a reciprocal relationship, according to earlier research, with nocturnal airway inflammation, sleep fragmentation, and intermittent hypoxia all contributing to increased respiratory symptoms and poor sleep quality [22].

There was no significant association between smoking status and excessive daytime sleepiness. Although smoking has been linked to sleep fragmentation and upper airway inflammation, prior epidemiological studies have reported conflicting results when controlling for obesity and other confounding variables [23].

The current results emphasize the importance of routine screening for sleep disturbances in Saudi primary healthcare facilities. Because obesity, hypertension, diabetes, and sedentary lifestyles are becoming more common in Saudi Arabia, incorporating validated screening tools such as the Epworth Sleepiness Scale into routine clinical assessment may help identify people at risk of obstructive sleep apnea earlier and refer them in a timely manner for appropriate management and confirmatory sleep studies [14,18].

Limitations

There are a number of limitations to this study. First, its cross-sectional design makes it impossible to demonstrate a causal association between participant characteristics and excessive daytime sleepiness. Second, recall and reporting bias may have affected the self-reported questionnaire data. Third, daytime sleepiness was measured using the Epworth Sleepiness Scale rather than objective diagnostic techniques such as overnight polysomnography, which prevented a conclusive diagnosis of obstructive sleep apnea. Fourth, the results may be less applicable to the entire Saudi adult population because of the preponderance of female participants. Finally, convenience sampling was used to recruit participants, which may introduce selection bias and reduce external validity.

Conclusion

Nearly two-fifths of Saudi adults in this study had excessive daytime sleepiness, suggesting a considerable burden of symptoms suggestive of obstructive sleep apnea. ESS scores were positively correlated with BMI, and higher BMI, overweight status, female sex, middle age, medication use, and asthma were all significantly associated with increased daytime sleepiness. These results highlight obesity as an important modifiable predictor of sleep-related breathing disorders. To enable early detection and prompt treatment, routine screening for OSA symptoms in primary healthcare settings should be promoted, particularly among overweight individuals and those with chronic illnesses. Future multicenter prospective studies using objective diagnostic techniques such as overnight polysomnography are needed to identify additional risk factors in the Saudi population and to more accurately estimate the true prevalence of OSA.

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